



PL1/45 2004/ 002148



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Date: 03 June 2004

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REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

| | |
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| PCT/GB 2003 / 003296 | |
| International Application No. | |
| 30 JUL 2003 | 30/07/2003 |
| International Filing Date | |
| United Kingdom Patent Office | |
| PCT International Application | |
| Name of receiving Office and "PCT International Application" | |

Applicant's or agent's file reference
(if desired) (12 characters maximum) TMG/P71163pc

Box No. I TITLE OF INVENTION
ANTI-VIRAL CLEANING COMPOSITION

Box No. II APPLICANT

☒ This person is also inventor

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

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State (that is, country) of residence:
GB

This person is applicant for the purposes of:

☒ all designated States

☐ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (that is, country) of residence if no State of residence is indicated below.)

This person is:

☐ applicant only

☐ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

Applicant's registration No. with the Office

State (that is, country) of nationality:

State (that is, country) of residence:

This person is applicant for the purposes of:

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☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

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Precautionary Designation Statement: In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation (including fees) must reach the receiving Office within the 15-month time limit.)

Box No. VI PRIORITY CLAIM

The priority of the following earlier application(s) is hereby claimed:

| Filing date of earlier application (day/month/year) | Number of earlier application | Where earlier application is: | | |
|---|----------------------------------|--|---|--|
| | | national application: country or Member of WTO | regional application:* regional Office | international application: receiving Office |
| item (1) 15 May 2003 (15.05.2003) | 0311174.7 | GB | | |
| item (2) | | | | |
| item (3) | | | | |
| item (4) | | | | |
| item (5) | | | | |

☐ Further priority claims are indicated in the Supplemental Box.

The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of this international application is the receiving Office) identified above as:

☒ all items ☐ item (1) ☐ item (2) ☐ item (3) ☐ item (4) ☐ item (5) ☐ other, see Supplemental Box

* Where the earlier application is an ARIPO application, indicate at least one country party to the Paris Convention for the Protection of Industrial Property or one Member of the World Trade Organization for which that earlier application was filed (Rule 4.10(b)(ii)):

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Choice of International Searching Authority (ISA) (if two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA /

Request to use results of earlier search; reference to that search (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year) Number Country (or regional Office)

Box No. VIII DECLARATIONS

The following declarations are contained in Boxes Nos. VIII (i) to (v) (mark the applicable check-boxes below and indicate in the right column the number of each type of declaration):

Number of
declarations

- | | | |
|---|--|---|
| <input type="checkbox"/> Box No. VIII (i) | Declaration as to the identity of the inventor | : |
| <input type="checkbox"/> Box No. VIII (ii) | Declaration as to the applicant's entitlement, as at the international filing date, to apply for and be granted a patent | : |
| <input type="checkbox"/> Box No. VIII (iii) | Declaration as to the applicant's entitlement, as at the international filing date, to claim the priority of the earlier application | : |
| <input type="checkbox"/> Box No. VIII (iv) | Declaration of inventorship (only for the purposes of the designation of the United States of America) | : |
| <input type="checkbox"/> Box No. VIII (v) | Declaration as to non-prejudicial disclosures or exceptions to lack of novelty | : |

Box No. IX CHECK LIST; LANGUAGE OF FILING

This international application contains:

(a) in paper form, the following number of sheets:

request (including declaration sheets) : 4
description (excluding sequence listings and/or tables related thereto) : 8
claims : 2
abstract : 1
drawings : 0

Sub-total number of sheets : 15

sequence listings :
tables related thereto :

(for both, actual number of sheets if filed in paper form, whether or not also filed in computer readable form; see (c) below)

Total number of sheets : 15

(b) ☐ only in computer readable form (Section 801(a)(i))

(i) ☐ sequence listings
(ii) ☐ tables related thereto

(c) ☐ also in computer readable form (Section 801(a)(ii))

(i) ☐ sequence listings
(ii) ☐ tables related thereto

Type and number of carriers (diskette, CD-ROM, CD-R or other) on which are contained the

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This international application is accompanied by the following item(s) (mark the applicable check-boxes below and indicate in right column the number of each item):

Number of items

1. ☒ fee calculation sheet : 1
2. ☐ original separate power of attorney :
3. ☐ original general power of attorney :
4. ☐ copy of general power of attorney; reference number, if any: :
5. ☐ statement explaining lack of signature :
6. ☐ priority document(s) identified in Box No. VI as item(s): :
7. ☐ translation of international application into (language): :
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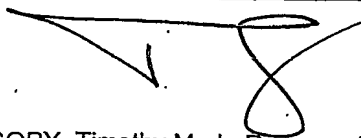
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Box No. X SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



GREGORY, Timothy Mark Representative of the Applicant

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1. Date of actual receipt of the purported international application:

30 JUL 2003 30/07/2003

3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

4. Date of timely receipt of the required corrections under PCT Article 11(2):

5. International Searching Authority (if two or more are competent): ISA /

6. ☐ Transmittal of search copy delayed until search fee is paid

2. Drawings:

☐ received:

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ANTI-VIRAL CLEANING COMPOSITION

The present invention relates to a liquid cleansing composition having an anti-viral action. More particularly, but not exclusively, it relates to a surface cleansing composition having both anti-viral and anti-bacterial activity.

There is increasing concern about bacterial and viral infections being transmitted to patients and staff in hospitals and the like. One vector of infection is believed to be incompletely disinfected surfaces, which may harbour bacteria and/or viruses that are resistant to existing surface cleaning agents. There is a strong suspicion that the spread of the recent SARS (Severe Acute Respiratory Syndrome) outbreak may have been linked to the ability of the SARS virus to resist conventional cleaning agents/disinfectants. Viruses spread from an infected patient thus remain viable and ready to be picked up by and to infect other patients and medical staff. Other pathogens, such as the MRSA bacterium, are also suspected to be surviving existing surface cleaning/disinfecting agents and routines.

It is known to use cationic surfactants, such as quaternary ammonium salts, as dual-purpose surface cleaning agents and bactericides. However, while such materials are generally found to be sufficient to deal with, say, food-poisoning bacteria in a food preparation environment, they are not regarded as sufficiently active to handle more dangerous and more resistant pathogens in a medical context.

Alcohols, such as *iso*-propanol, and halogens, such as iodine, have in the past been used as relatively crude topical disinfecting agents around wounds and skin lesions, but they have not proven suitable for wide area cleaning of hard surfaces and the like. For example, iodine can stain many surfaces, and its use at high concentrations is limited by safety considerations.

It is hence an object of the present invention to provide a liquid cleansing and disinfecting preparation, suitable for use on hard surfaces, with a high anti-viral and anti-bacterial effectiveness.

According to the present invention, there is provided an aqueous surface cleaning and disinfecting preparation comprising at least one aliphatic alcohol, a long-chain alkyl polyamine compound, and iodine.

Preferably, the long-chain alkyl polyamine compound comprises a long-chain alkyl triamine compound.

The composition may comprise a mixture of long-chain alkyl polyamine compounds having a range of different alkyl chain lengths.

Advantageously, the long-chain alkyl polyamine compound comprises a compound of the general formula $R-NH-(CH_2)_m-NH-(CH_2)_n-NH_2$, where R is a linear or branched alkyl chain comprising at least eight carbon atoms, and each of m and n equals either 2 or 3.

R may be a linear or branched alkyl chain comprising between ten and fourteen carbon atoms.

Each of m and n may equal 3.

Preferably, the at least one aliphatic alcohol comprises between one and four carbon atoms.

Advantageously, the composition comprises two aliphatic alcohols.

Optionally, the composition comprises ethanol and *n*-propanol.

The composition may comprise between 10% and 30% by volume aliphatic alcohols.

Advantageously, the composition comprises between 15% and 25% by volume aliphatic alcohols.

The composition may comprise between 10% and 20% by volume ethanol and between 5% and 10% by volume *n*-propanol.

Optionally, the composition may comprise between 14% and 16% by volume ethanol and between 5% and 7% by volume *n*-propanol.

The composition preferably comprises up to 0.5% by weight iodine.

Advantageously, the composition comprises between 0.1% and 0.5% by weight iodine.

Optionally, the composition may comprise $0.33\% \pm 0.05\%$ by weight iodine.

The composition preferably comprises between 10% and 30% by volume of the long-chain alkyl polyamine compound or compounds.

Advantageously, the composition comprises between 15% and 25% of the long-chain alkyl polyamine compound or compounds.

Optionally, the composition may comprise $20\% \pm 2\%$ of the long-chain alkyl polyamine compound or compounds.

The composition may comprise a complexing agent adapted to form a complex with the iodine.

The composition may comprise at least one buffering agent, such as nitrilotriacetic acid or its salts.

The composition may comprise at least one wetting agent, such as a polyglycol ether, optionally a polyethylene glycol ether or a polypropylene glycol ether.

An embodiment of the present invention will now be described more particularly by way of example.

An aqueous surface cleaning composition was prepared, comprising:

| | |
|--------------------|----------------|
| NTA 89% powder | 0.85 kg |
| Ethanol | 15.0 litres |
| <i>n</i> -Propanol | 6.0 litres |
| Topanol O FG | 0.55 litres |
| Sandoteric SC | 2.42 litres |
| Sandozin NRW conc | 6.95 litres |
| Sandoteric ABD | 4.45 litres |
| Triameen Y12D-30 | 19.99 litres |
| Deionised water | 43.4524 litres |
| Iodine (solid) | 0.3376 kg |

The composition appeared as a pale yellow clear liquid with a pH of approximately 8 and a slight alcoholic odour.

NTA is nitrilotriacetic acid trisodium salt, a buffering agent. Topanol O FG is food-grade butylated hydroxytoluene, an antioxidant, sold by Chance & Hunt Ltd. (Topanol is a registered trade mark of ICI plc). Sandozin NRW conc is a polyethoxylate ether sold by

Clariant as a wetting agent. It also forms a relatively stable complex with iodine. Sandoteric SC is a sulphobetaine amphoteric surfactant, which acts as a detergent, and Sandoteric ABD is a complex mixture of amphoteric surfactants acting as a detergent and having a degree of bactericidal activity. Both are sold by Clariant. (Sandozin and Sandoteric are registered trade marks of Novartis SA) Triameen Y12D-30 is a long-chain alkyl triamine of the general formula $R'-NH-C_3H_6-NH-C_3H_6-NH_2$, where R' is a "tallow alkyl" – a naturally-derived mixture of alkyl chains of different lengths, the most common of which is a dodecyl chain. It is sold by Akzo Nobel.

It is believed that in a suitably buffered solution, the triamine forms a cationic species. Together with the amphoteric surfactants, it attacks the phospholipid membranes which form the outer wall of a bacterium or the capsid of a virus. In most cases, these membranes are ruptured or lysed, leading to release of the bacterium's DNA or the virus' RNA, as the case may be. The complexed iodine and the alcohols are believed to act in conjunction on viral RNA, effectively destroying it and eradicating the virus. The triamine and the amphoteric surfactants are believed either to attack and cleave bacterial DNA, or to bind to critical parts of the helix, in either case preventing it from replicating. The alcohols may also contribute to the attack on the membranes.

Even where the membranes are not sufficiently damaged to release their contents for destruction, the composition is found to inactivate the bacterium or virus for prolonged periods (at least 14 days in current testing, much longer than for current cleaners/disinfectants).

The combined action of the components of the composition is thus to break up and destroy a majority of bacteria and viruses, and to inactivate undestroyed bacteria and viruses for prolonged periods. The composition also has a conventional detergent/cleansing effect, removing macroscopic soiling from a surface to which it is applied, as well as washing off undestroyed bacteria/viruses and the debris of the destroyed. It has been found to have minimal deleterious effect on the surfaces tested, and does not stain surfaces as would conventional formulations containing similar levels of iodine.

It is hypothesised that compositions with higher levels of iodine may be useful in some applications, although alterations to the other components, such as raised levels of one or both alcohols, may then be needed for stability.

The composition also has a degree of activity against fungi, moulds and yeasts, although it is believed that a modified formulation, for example with an alternative alcohol blend, might be required for full effectiveness against the tougher walls of fungal spore cells and the like.

Testing has shown that the composition passes the standard "555-challenge" test (see British Standard BS EN 1276:1997 and the French Afnor test). As an effective anti-viral and anti-bacterial cleansing agent, it may be categorised as a (2) category disinfectant in the system employed by the UK National Health Service, suitable for cleaning in "medium high risk" areas.

In the stringent RNA destruction test using canine poliovirus and Norwalk virus, the composition described passes the test at very high RNA concentrations, considerably outperforming conventional systems. It is therefore believed that the composition is

sufficiently active that even robust and highly resistant pathogens such as the SARS virus will be substantially completely eliminated by a simple washing treatment.

CLAIMS

1. An aqueous surface cleaning and disinfecting composition comprising at least one aliphatic alcohol, a long-chain alkyl polyamine compound, and iodine.
2. A composition as claimed in claim 1, wherein the long-chain alkyl polyamine compound comprises a compound of the general formula
$$\text{R-NH-(CH}_2\text{)}_m\text{-NH-(CH}_2\text{)}_n\text{-NH}_2,$$
where R is a linear or branched alkyl chain comprising at least eight carbon atoms, and each of m and n equals either 2 or 3.
3. A composition as claimed in claim 2, wherein R is a linear or branched alkyl chain comprising between ten and fourteen carbon atoms.
4. A composition as claimed in either claim 2 or claim 3, wherein each of m and n is 3.
5. A composition as claimed in any one of the preceding claims, comprising between 10% and 30% by volume, preferably between 15% and 25% by volume, of the long-chain alkyl polyamine compound.
6. A composition as claimed in any one of the preceding claims, comprising two aliphatic alcohols, at least one of which comprises between one and four carbon atoms.
7. A composition as claimed in claim 6, comprising ethanol and *n*-propanol,

8. A composition as claimed in any one of the preceding claims, comprising between 10% and 30% by volume, preferably between 15% and 25% by volume, aliphatic alcohols.
9. A composition as claimed in either claim 7 or claim 8, comprising between 10% and 20% by volume ethanol and between 5% and 10% by volume *n*-propanol, preferably between 14% and 16% by volume ethanol and between 5% and 7% by volume *n*-propanol.
10. A composition as claimed in any one of the preceding claims, comprising up to 0.5% by weight, preferably between 0.1% and 0.5% by weight, iodine.

ABSTRACT

ANTI-VIRAL CLEANING COMPOSITION

The composition is a liquid cleansing and disinfecting preparation, suitable for use on hard surfaces, with a high anti-viral and anti-bacterial effectiveness. It comprises at least one aliphatic alcohol, iodine and one or a mixture of long-chain alkyl polyamine compounds, especially an alkyl triamine compound.

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